

FINAL TECHNICAL REPORT

FOR NASA GRANT NAG-3-1550

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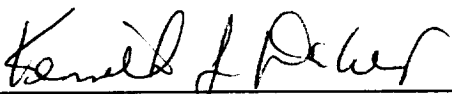
SHOCK OSCILLATION AND ITS RELATION TO THE SCREECH AND
BROADBAND NOISE IN UNDEREXPANDED FREE JETS

Prepared for

NASA Lewis Research Center
Cleveland, Ohio 44135

by

Principal Investigator:


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The work done under this grant from NASA Lewis began in November, 1993, and was completed in March, 1996. The grant was used to support the research performed by Jayanta Panda, a Research Associate at the University of Toledo. Dr. Panda was on-site at NASA Lewis where the work was performed.

The attached sheet of publications and presentations constitutes the final report for this grant. All of these publications are available in the open literature, and all have previously been submitted to the grant technical monitor.

**A list of publications and major presentations of J. Panda
during tenure at the University of Toledo**

Publications:

1. Panda, J.: "Measurement of Shock Oscillation in Underexpanded Supersonic Jets," AIAA paper no. 95-2145, 26th AIAA Fluid Dynamics Conference, San Diego, 1995.
2. Panda, J., "Wide Angle Light Scattering in Shock-Laser Interaction," *AIAA Journal*, vol. 33, no. 12, pp. 2429-2431, Dec. 1995.
3. Panda, J. and Adamovsky, G., "Laser light scattering by shock waves," to appear in *Physics of Fluids*, Sept. 1995; also AIAA paper no. 95-0518, 33rd Aerospace Sciences Meeting and Exhibit, 1995.
4. Panda, J., "A Shock Detection Technique Based on Light Scattering by Shock," *AIAA Journal*, vol. 33, no. 12, pp. 2431-2433, Dec. 1995.
5. Panda, J.: "Partial spreading of a laser beam into a light sheet by shock waves and its use as a shock detection technique," NASA CR-195329, May 1994.

Major presentations:

1. Panda, J.: "Partial spreading of a laser beam into a light sheet by shock waves and its use as a shock detection technique," presented at the 46th Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Albuquerque, NM, Nov. 1993.
2. Panda, J.: "Measurement of Shock Oscillation in Underexpanded Screeching Jets," presented at the 1994 meeting of the division of Fluid Dynamics, American Physical Society, Nov. 1994.
3. Panda, J., J. Lepicovsky and R. J. Bruckner: "Measurement of Shock Unsteadiness by Light Scattering from Laser-Shock Interaction," presented at the Northern Ohio AIAA Mini-Symposium, May 16, 1994.